

### 3 Detection of Hearing Loss

“The principal risk of deafness from continuous excessive noise is related to the decrease in sensitivity of the ear to sound lying within the 1 to 4 kilohertz (kHz) frequency band. The construction of the ear is such that it responds particularly well to frequencies lying between 1 and 4 kHz. These frequencies lie within the range of normal speech. Accordingly, damage to the ear affecting the responsiveness of the ear between 1 and 4 kHz affect hearing most,” Mr Justice Mustill in *Thompson v Smiths Shiprepairers*.

Where the results are represented on a graph which plots the hearing loss against the frequency, a marked dip in hearing starts to occur at about 1 kHz (sometimes at 2 kHz) with a low point at 4 kHz, often accompanied by a recovery at 8 kHz. Classically, noise-induced damage leaves a steep isolated dip on the graph, a V-shaped signature or “acoustic notch” at 4 kHz. Why loud sounds of all frequencies should damage the sensitivity of the ear to frequencies near 4 kHz is the subject of various medical explanations, but the V-shaped notch at 4 kHz serves as good (but not absolute) evidence that the hearing loss is noise-induced.

One judge [1] described his reading of an audiogram: “If you look along to 2 kHz, the loss is marginal, but there is a plummeting of the audiogram at 3 kHz, it goes down to 60 and it goes even lower at 4 kHz.” He then commented that the averages for the three totals taken at 1, 2 and 3 kHz gave a somewhat distorted picture of the effect on hearing.

Some recovery can take place but continuous noise exposure leads to permanent damage. The V-shape widens in angle with further damage and in bad cases, the graph may be quite flat. Impairment of hearing at higher frequencies occurs more readily than at lower frequencies. A graph sloping downhill towards the higher frequencies is common: the ski-slope or cliff type of graph.

The impact of excessive noise is not the only cause of hearing loss. There is an ageing process, known as presbycusis, which entails the progressive loss of the higher frequencies. The graph plotted from a person suffering from this kind of hearing loss will display a slope, but the profile is of a different shape from the cliff or notch typical of noise-induced deafness.

The hearing tests which are undertaken are crucial to the diagnosis and accurate quantification of hearing loss. The degree of accuracy required if financial compensation is at stake is much greater than that required for medical diagnosis [2]. The basis of most compensation assessments for noise-induced hearing loss is the Pure-Tone Audiogram, as the graph is called.

The audiogram has been described judicially. “The tests are conducted in this way, as I understand it: Noises at differing frequencies are made, and a measurement is taken of when, and what strength of those noises and at what frequencies the patient or injured person (as the case may be) is able to hear them. Then the results of such tests are plotted. Each ear is

[1] Mr Justice Forbes in *Abramowicz v The Carborundum Co Ltd*, 1981, Kemp & Kemp.

[2] Travel fatigue, alcohol, emotional and anxiety states cause variations in consecutive audiograms (Royal Navy Anti-Submarine Department). Identical ambient conditions are necessary; a quiet room is best. Inconsistent results in a dead silent room result from the tendency of the subject to hallucinate (Ransome-Wallis, University of Toronto).

tested separately and by means of a calculation it is possible to come to a conclusion as to the threshold of noise detected by the patient at the various frequencies concerned," Lord Justice Waller in *Faulkner v British Rail Engineering Ltd*, 23 January, 1984, Court of Appeal. The loss of hearing is expressed in decibels (dB).

A bona fide complaint of deafness to a general practitioner or factory physician before compensation was ever contemplated is a weighty piece of evidence. This is rarely

available but diligent solicitors may make strenuous attempts to find out the circumstances of the initial presentation.

The position of a claimant who is caught cheating during audiometric tests is as tenuous as discredited witnesses and impeached evidence. The defence will certainly draw the attention of the court to the initial irregularities even after "amended evidence" or "further and better particulars" (legal euphemisms). Such a claimant should try to salvage the best settlement out-of-court [3].

[3] Psychological injury is compensable under English law e.g. nervous shock in *Brice v Brown* [1984] 1 All ER 997 but in *Trugden v Monsanto Chemicals*, 6 April 1971, Winchester Assizes, Mr Justice Lawton was not impressed by inconsistencies in the audiogram when the claimant alleged psychogenic deafness after barotrauma. The claimant was also found to be unreliable in court.